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Transmitted herewith for filing under 35 U.S.C. 111 and 37, C.F.R. 1.53 is the patent application of:

INVENTOR(S): SCOTT BRUNK

FOR: GPS RECEIVER AND DEPTH SOUNDER UNIT HAVING AN ADJUSTABLE DISPLAY SCREEN

Enclosed are:

- ☒ Certificate of Mailing with Express Mail Mailing Label No. EL541128963US
- ☒ 3 sheets of drawing(s)
- ☒ Combined Declaration and Power of Attorney
- ☒ An Assignment of the invention to GARMIN CORPORATION together with the recording fee of \$40.00.
- ☐ A verified statement to establish small entity status under 37 CFR 1.9 and 37 CFR 1.27.
- ☒ Information Disclosure Statement

The filing fee has been calculated as shown below:

(Col. 1) (Col. 2)

FOR	NO. FILED	NO. EXTRA
BASIC FEE		
TOTAL CLAIMS	11-20=	* 0
INDEP. CLAIMS	3-3=	* 0
MULTIPLE DEPENDENT CLAIM PRESENT		

*If the difference in col. 1 is less than zero, enter "0" in Col. 2

SMALL ENTITY

RATE	FEE
	\$ 345 00
x 9	
x 39	
+130	
TOTAL	\$

OTHER THAN A
SMALL ENTITY

RATE	FEE
	\$ 690 00
x 18	
x 78	
+260	
TOTAL	\$690 00

Please charge my Deposit Account No. 19-0522 in the amount of \$ _____. A duplicate of this sheet is enclosed.

- ☒ A check in the amount of \$690.00 to cover the filing fee is enclosed.
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- ☒ Any additional filing fees required under 37 CFR 1.16.
- ☒ Any patent application processing fees under 37 CFR 1.17.
- ☒ The Commissioner is hereby authorized to charge payment of the following fees during the pendency of this application or credit any overpayment to Deposit Account No. 19-0522. A duplicate copy of this sheet is enclosed.
- ☒ Any patent application processing fees under 37 CFR 1.16.
- ☐ The issue fee set in 37 CFR 1.18 at or before the mailing of the Notice of Allowance, pursuant to 37 CFR 1.311(f).
- ☒ Any fees under 37 CFR 1.16 for presentation of extra claims.

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GPS RECEIVER AND DEPTH SOUNDER UNIT HAVING AN
ADJUSTABLE DISPLAY SCREEN

5

BACKGROUND OF THE INVENTION

1. FIELD OF THE INVENTION

The present invention relates to navigational devices. More particularly, the invention relates to a combined GPS receiver and depth sounder unit that includes
10 a single display screen that can be smoothly adjusted so that the area of the display screen devoted to a GPS map can be changed relative to the area devoted to a depth sounder display.

2. DESCRIPTION OF THE PRIOR ART

Many types of navigational devices exist for both recreational and professional use. For example, many fishermen, boaters, and other sportsmen use GPS receivers to determine and view their current location and depth sounders to determine the depth of a body of water.

Recently, GPS receivers and depth sounders have been combined in
20 single units to permit users to determine both their current location and the depth of a body of water. These combined units typically include a single display screen that displays both a GPS map display and a depth sounder display.

Combined GPS receivers and depth sounder units allocate a fixed amount of their display screens for the GPS map display and the depth sounder display, for
25 example, approximately 75% for the GPS map and approximately 25% for the depth sounder display. This fixed division of the display screen is a limitation because users may wish to adjust the relative size of the GPS map and depth sounder displays in certain circumstances. For example, a fisherman who is primarily interested in determining and viewing the depth of a body of water may wish to enlarge the depth
30 sounder display relative to the GPS map display to provide more resolution for the depth display.

OBJECTS AND SUMMARY OF THE INVENTION

The present invention solves the above-described problems and provides a distinct advance in the art of navigational devices. More particularly, the present invention provides a navigational device with a single display screen that simultaneously
5 displays two different sets of information and that permits an operator to selectively adjust the portion of the display screen that is devoted to each of the sets of information.

In one preferred embodiment, the navigational device is a combined GPS receiver and depth sounder unit that includes a first input port for receiving a sensor signal from a depth sounder transducer; a second input port for receiving a location
10 signal; a display screen including a first display area for displaying information corresponding to the sensor signal and a second display area for displaying information corresponding to the location signal; and a computing device coupled with the display screen. The computing device is programmed to permit a viewer to selectively adjust the size of the first and second display areas relative to one another to change the
15 relative portion of the display screen that is occupied by the first and second display areas. This display adjustment is smooth (i.e., finely adjustable) so that a viewer can select any number of different sizes for the first and second display areas within the limits of the overall size of the display screen and the resolution of the screen.

These and other important aspects of the present invention are described
20 more fully in the detailed description below.

BRIEF DESCRIPTION OF THE DRAWING FIGURES

A preferred embodiment of the present invention is described in detail below with reference to the attached drawing figures, wherein:

Fig. 1 is an elevational view of a GPS receiver and depth sounder unit constructed in accordance with a preferred embodiment of the present invention and shown connected to a depth sounder transducer and an antenna.
25

Fig. 2 is a block diagram depicting several of the components of the combined GPS receiver and depth sounder unit of Fig. 1.

Fig. 3 is a screen display showing the simultaneous display of a GPS map display and a depth sounder display on the unit.
30

Fig. 4 is a screen display illustrating a first step in the method of resizing the GPS map display and the depth sounder display.

Fig. 5 is a screen display illustrating a second step in the method of resizing the GPS map display and the depth sounder display.

Fig. 6 is a screen display illustrating a third step in the method of resizing the GPS map display and the depth sounder display.

5 Fig. 7 is a screen display illustrating a fourth step in the method of resizing the GPS map display and the depth sounder display.

Fig. 8 is a flow diagram illustrating certain steps performed by a computer program that is used to resize the displays.

10 DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Turning now to the drawing figures, and particularly Figs. 1 and 2, a combined GPS receiver and depth sounder unit 10 constructed in accordance with a preferred embodiment of the invention is illustrated. The unit is operable for determining and displaying both GPS location information and depth information for a body of water and broadly includes a computing device 12, a display screen 14, one or more input devices 16, and memory 18 all housed in or on an outer housing 20.

15 In more detail, the computing device 12 is provided for controlling operation of the other components of the unit as described herein in response to information received from external sensors and antennas. In one preferred embodiment, the computing device 12 is coupled with a first input port 22 that in turn may be coupled with a sonic-type depth transducer 24. The depth transducer generates sensor signals representative of the depth of a body of water and transmits the signals to the computing device 12. The computing device 12 analyzes the sensor signals and, together with other conventional electronics in the unit 10, displays information on the display screen 14 relating to the sensor signals.

25 The computing device 12 is also preferably coupled with a second input port 26 that in turn may be coupled with an antenna 28. The antenna receives location signals such as GPS signals representative of the location of the unit from GPS satellites and delivers the signals to the computing device 12. The computing device 12 analyzes the location signals and, together with other conventional electronics in the unit 10, displays information on the display screen 14 relating to the location signals.

30 The display screen 14 is coupled with the computing device 12 for displaying information relating to the signals received from the transducer 24 and the

antenna 28. In one preferred embodiment of the invention, the display screen simultaneously displays a depth sounder display in a first area 30 of the display screen and a GPS map in a second area 32 of the display screen. In another embodiment, the unit 10 may be dedicated to depth sounder capabilities only and display a regular sized
5 depth sounder display in the first display area 30 and an enlarged or zoomed depth sounder display in the second display area 32. The display is preferably a liquid crystal display (LCD).

The input devices 16 are coupled with the computing device 12 and are provided for operating the unit 10 in a conventional manner and for permitting an
10 operator to adjust the size of the first and second display areas 30, 32 of the display screen 14 as described in more detail below. The input devices 16 preferably include an Enter key 34, a Menu key 36, a Scrolling key 38, a Quit or Escape key 39, and several other keys found on conventional GPS receiver and depth sounder units such as the GPS 162 unit mentioned above.

In accordance with one important aspect of the present invention, the
15 computing device 12 is programmed to permit a viewer to selectively and smoothly adjust the relative size of the first and second display areas 30, 32 of the display screen 14 to any number of different sizes within the limits of the overall size and resolution of the display screen. For example, a user may wish to enlarge the depth
20 sounder display relative to the GPS map display to improve the detail and/or resolution of the depth sounder display. The computer program that performs this function may be implemented in firmware or stored in memory 40 accessible by the computing device. The computer program is preferably written in C, but may be written in any computer language as a matter of design choice.

A user first initiates the screen adjustment feature of the present invention
25 by pressing the Menu key 36 on the front of the unit 10. The computing device 12 then displays a menu box 42 over the GPS map and the depth sounder display as depicted in Fig. 4. The user may then select to resize the map by selecting this option from the menu.

When the user selects the Resize Map option, a cursor 44 and bold line
30 46 are displayed over the boundary between the first and second display areas 30, 32 as depicted in Fig. 5. The user may then adjust the relative size of the two display areas by pressing either the left or right arrow on the Scrolling key 38. For example, if the user

wishes to increase the size of the depth sounder display relative to the GPS map display, the user would push the left arrow on the Scrolling key 38. This causes the cursor 44 and bold line 46 to move to the left as illustrated in Fig. 6. Once the user has moved the cursor 44 and bold line 46 to a preferred location, the computing device 12
5 reallocates the portion of the display screen 14 that is devoted to the first and second display areas 30, 32 as depicted in Fig. 7 and resizes the GPS map and depth sounder display to fit their respective display areas.

Fig. 8 is a flow diagram depicting the steps performed by the computer program during the screen display resizing process described above. The screen
10 resizing portion of the computer program begins when a user initiates the resizing function as depicted in step 800. The computer program then waits for the user to press the Scrolling key 38 as depicted in step 802 and continues to loop through step 802 until the key is pushed.

The computer program next determines whether the left or right cursor 44
15 on the Scrolling key 38 is pressed as depicted in step 804. If the left cursor is pressed, the program determines whether a left adjustment limit has been reached in step 806. The adjustment limits are preprogrammed size limits for the two display areas 30, 32. For example, in one preferred embodiment of the invention, the second display area 32 devoted to the GPS map display occupies at least 50%, but no more than 75%, of the
20 display screen. Conversely, the first display area 30 devoted to the depth sounder display occupies at least 25%, but no more than 50% of the display screen.

If an adjustment limit has been reached in step 806, the computer program causes the unit 10 to generate an error tone or signal as depicted in step 808. However, if an adjustment limit has not been reached, the computer program moves the boundary
25 or divider between the two display areas 30, 32 to the left as depicted in step 808 and then returns to step 802 to wait for further screen adjustments.

If the user presses the right cursor in step 804, steps 812, 814, and 816 perform the same functions as steps 806, 808, and 810, except that the divider or boundary is moved to the right.

30 Once the user stops moving the cursor to the left or right, step 818 of the computer program waits for the user to either press the Enter key 34 or the Escape key 39. If the user presses the Escape key, the computer program restores the screen division to the previous location and then resumes normal operation. However, if the

user presses the Enter key, the computer program resizes the display screen according to the new position of the divider or boundary as depicted in step 822.

From the foregoing description of a preferred embodiment of the present invention, one skilled in the art will appreciate that the present invention offers an advance in the art of navigational devices by providing such a device with a single display screen that simultaneously displays two different sets of information and that permits an operator to selectively adjust the portion of the display screen that is devoted to each of the sets of information. The navigational device of the present invention permits a smooth adjustment of the display areas of the display screen so that an operator may adjust the sizes of the display areas limited only by the overall size and resolution of the display screen.

Although the invention has been described with reference to the preferred embodiment illustrated in the attached drawing figures, it is noted that equivalents may be employed and substitutions made herein without departing from the scope of the invention as recited in the claims. For example, although the preferred embodiment of the present invention is implemented on a combined GPS receiver and depth sounder unit, it may be used with other navigational devices including a dedicated depth sounder unit that includes a display screen having a first display area for a regularly sized depth sounder display and a second display area for an enlarged or zoomed depth sounder display.

Having thus described the preferred embodiment of the invention, what is claimed as new and desired to be protected by Letters Patent includes the following:

CLAIMS:

1. A navigational device comprising:

a first input port for receiving a sensor signal from a sensor, the sensor signal being representative of a sensed condition;

a second input port for receiving a location signal, the location signal being representative of a location of the navigational device;

a display screen including a first display area for displaying information corresponding to the sensed condition and a second display area for displaying information corresponding to the location signal; and

a computing device coupled with the display screen, the computing device being operable to permit a viewer to selectively adjust a size of the first and second display areas to change the relative portion of the display screen that is occupied by the first and second display areas.

2. The navigational device as set forth in claim 1, the computing device being operable to permit the viewer to smoothly adjust the size of the first and second display areas to a number of different sizes.

3. The navigational device as set forth in claim 1, the sensor including a sonic transducer, the sensed condition including depth of a body of water.

4. The navigational device as set forth in claim 3, the information corresponding to the sensed condition including a depth display.

5. The navigational device as set forth in claim 1, the location signal including a GPS signal.

6. The navigational device as set forth in claim 5, the information corresponding to the location signal including a GPS map.

7. A navigational device comprising:

an input port for receiving a sensor signal from a sensor, the sensor signal being representative of a sensed condition;

5 a display screen including a first display area for displaying a first set of information corresponding to the sensed condition and a second display area for displaying a second set of information corresponding to the sensed condition; and

10 a computing device coupled with the display screen, the computing device being operable to permit a viewer to selectively adjust a size of the first and second display areas to change the relative portion of the display screen that is occupied by the first and second display areas.

8. The navigational device as set forth in claim 7, the computing device being operable to permit the viewer to smoothly adjust the size of the first and second display areas to a number of different sizes.

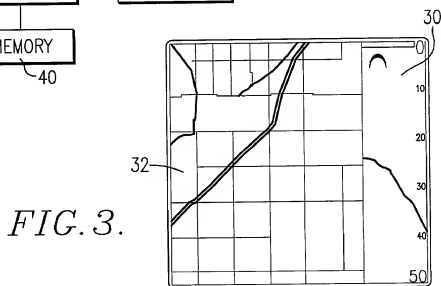
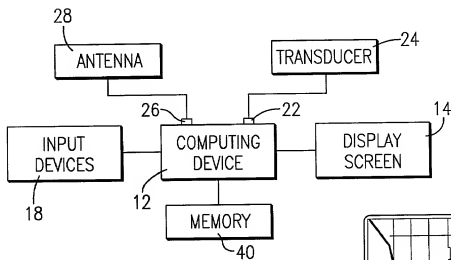
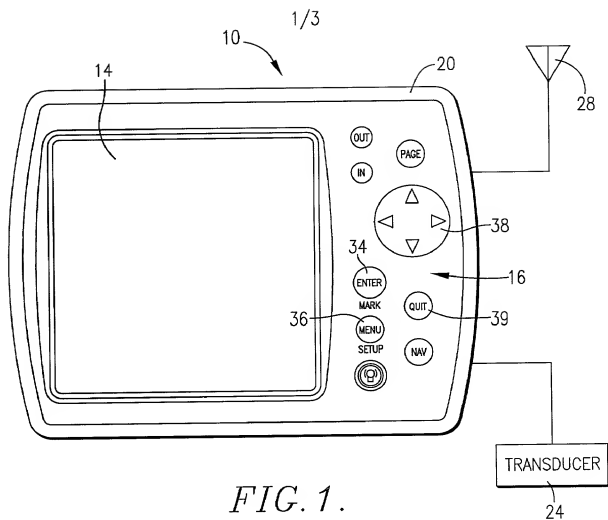
9. The navigational device as set forth in claim 7, the sensor including a sonic transducer, the sensed condition including depth of a body of water.

20 10. The navigational device as set forth in claim 9, the first set of information including a depth display and the second set of information including an enlarged depth display.

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11. In a navigational device including a display screen having a first display area for displaying a first set of information and a second display area for displaying a second set of information and a computing device coupled with the display screen, a computer program for instructing the computing device to operate as follows:

- 5 receiving a request from a viewer to adjust a size of the first and second display areas;
- adjusting the size of the first and second display areas in response to the request to change the relative portion of the display screen that is occupied by the first and second display areas; and
- 10 displaying the first and second sets of information in the first and second display areas after the first and second display areas have been resized.



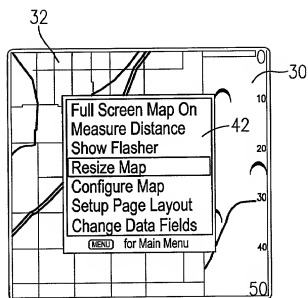


FIG. 4.

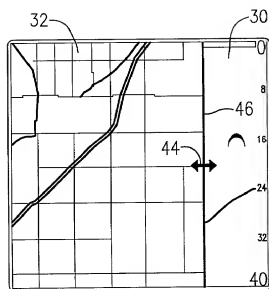


FIG. 5.

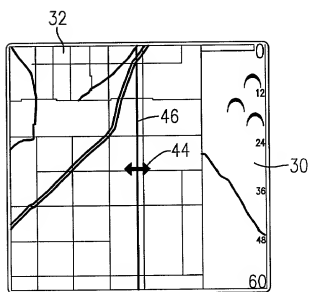


FIG. 6.

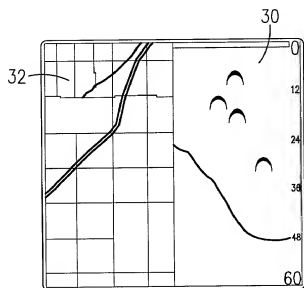


FIG. 7.

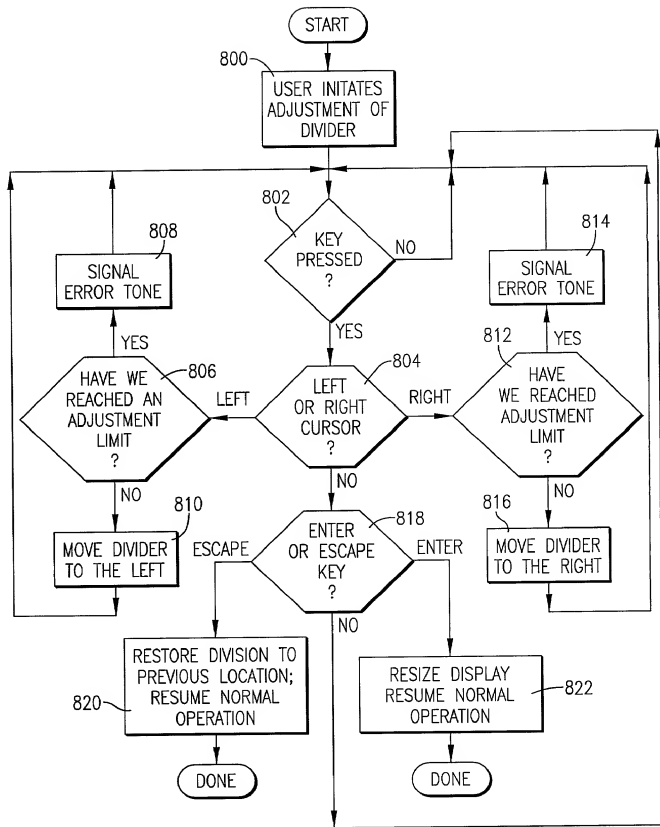


FIG. 8.

COMBINED DECLARATION AND POWER OF ATTORNEY

(Original, Design, National Stage of PCT
or CIP Application)ATTORNEY'S DOCKET NO.
30278

As a below named inventor I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name, I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

GPS RECEIVER AND DEPTH SOUNDER UNIT HAVING AN ADJUSTABLE DISPLAY SCREEN

the specification of which: (complete (a), (b) or (c) for type of application)

REGULAR OR DESIGN APPLICATION(a) ☒ [X] is attached hereto.(b) ☐ [] was filed on _____ as Application Serial No. _____ and was amended on _____ (if applicable).**PCT FILED APPLICATION ENTERING NATIONAL PHASE**(c) ☐ was described and claimed in International Application No. _____ filed _____ and as amended on _____ (if any).**ACKNOWLEDGMENT OF REVIEW OF PAPERS AND DUTY OF CANDOR**

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56(a).

☒ [X] In compliance with this duty there is attached an information disclosure statement. 37 CFR 1.97.

PRIORITY CLAIM

I hereby claim foreign priority benefits under Title 35, United States Code, § 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed: (complete (d) or (e))

(d) ☒ [X] no such applications have been filed.(e) ☐ [] such applications have been filed as follows**EARLIEST FOREIGN APPLICATION(S), IF ANY FILED WITHIN 12 MONTHS PRIOR TO SAID APPLICATION**

Country	Application No.	Date of Filing	Date of Issue	Priority Claimed
				<input type="checkbox"/> YES <input type="checkbox"/> NO
				<input type="checkbox"/> YES <input type="checkbox"/> NO
				<input type="checkbox"/> YES <input type="checkbox"/> NO

ALL FOREIGN APPLICATION(S), IF ANY FILED MORE THAN 12 MONTHS PRIOR TO SAID APPLICATION

PROVISIONAL

I hereby claim the benefit under Title 35, United States Code, § 119(e) of any United States application(s) listed below:

Application Serial No. Filing Date Status (patented, pending, abandoned)

CONTINUATION-IN-PART

(Complete This Part Only If This Is A Continuation-In-Part Application)

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose to the Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56(a), which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application:

Application Serial No. Filing Date Status (patented, pending, abandoned)

POWER OF ATTORNEY

As a named inventor, I hereby appoint the following attorney(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith:

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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